THE SYSTEM OF PERSONAL IDENTIFICATION BY FINGER PRINTS RECENTLY ADOPTED FOR THE U. S. ARMY.

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Some system of personal identification is a necessity in armies, and is of special importance in this country, not only for convenience of military administration to purge the Army of criminals, repeaters and other undesirable characters who may have gained admission to it by fraudulent enlistment, but also to protect the interest alike of the government and the individual in cases of claims against the former, based on the fact of military service. It may also assist under some circumstances in the identification of the dead.

MODIFIED BERTILLON SYSTEM.

The system first adopted in the U. S. Army was an adaptation of the pathologic division of the Bertillon system, viz., description of moles, scars, tattoos, blemishes, etc., together with certain simple measurements and physical characteristics, such as height, color of hair, eyes and skin. The complete Bertillon system was not adopted because it required the use of bulky and expensive instruments for exact measurements, and considerable practice and skill in their manipulation to avoid a degree of inexactness which would defeat the system, and also because of its disagreeable association with police methods of detecting criminals.

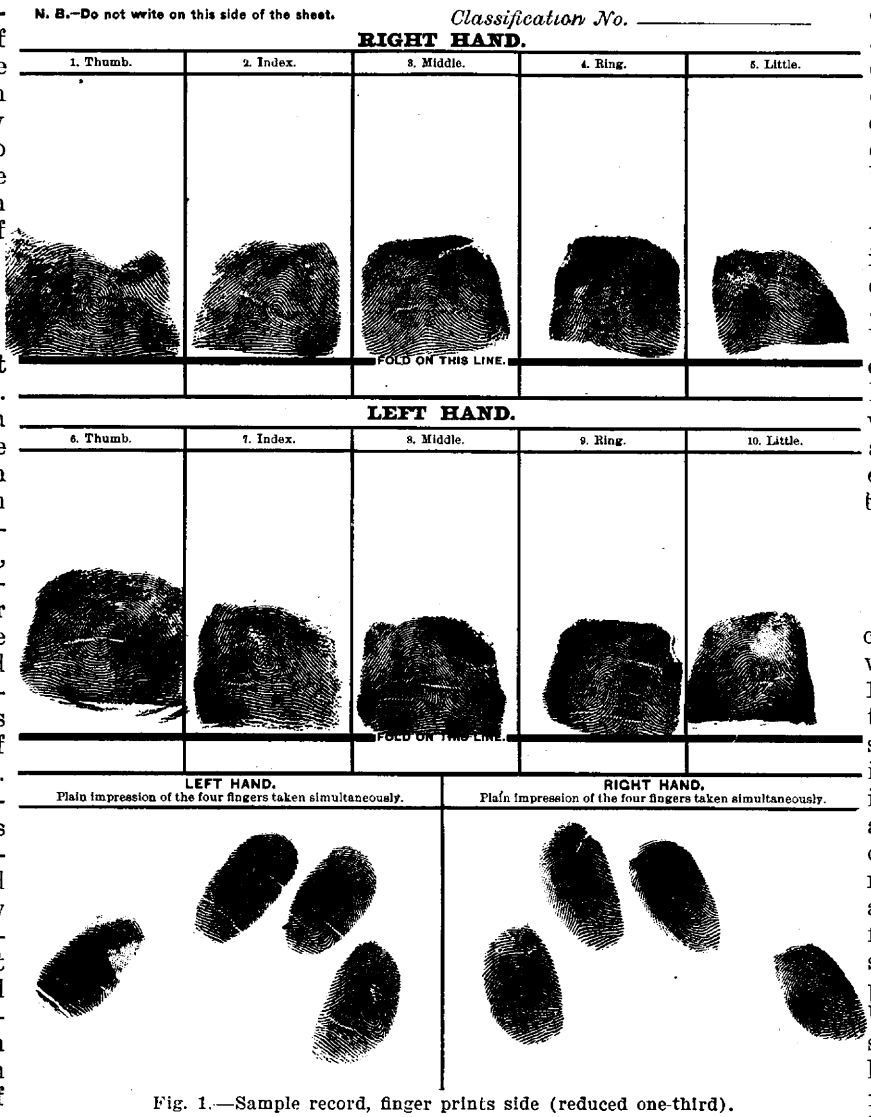

Fig. 1.—Sample record, finger prints side (reduced one-third).

This system, adopted in 1889, fulfilled very satisfactorily for our small Army during a decade the special purpose for which it was introduced, namely, to check the custom of "repeating," by which is meant the fraudulent reënlistment, usually under an assumed name, of deserters and dishonorably discharged men. Besides ridding the Army of undesirable material which injured its discipline, lowered its moral standard and discredited its uniform, this system was found in the first seven years of its operation to have reduced desertions to the extent of an average of 1,300 a year as compared with the seven years preceding its adoption. As the estimated loss to the government by each desertion for clothing, transportation, pay, etc., is $260, this represented a money saving of $338,000 a year.

In the course of fifteen years, and especially subsequent to the Spanish War, when the Army was increased in size, although its use was not extended to volunteer troops, this system broke down because, after the number of cards became large, no system could be found of devising a method of extending the limited classification with any degree of accuracy. On March 31, 1901, over 200,000 transcript cards were on file, and the number of cards with which each outline figure card of an original enlistment had to be compared became so great that the labor and time involved in the operation became excessive, so that it became inoperative even as to the delinquent class, while it was not adapted to the other uses mentioned above.

FINGER-PRINT SYSTEM.

Under these circumstances a board was appointed Oct. 11, 1905, to investigate the various systems of personal identification now in use, and, after an exhaustive study of the subject, it recommended the adoption of the finger-print system, supplemented by a photograph and brief personal description. For the latter the outline figure card used heretofore is to be employed, but with fewer entries.

The reasons given by the board for preferring the finger-print system of Galton, as improved by Henry, to the anthropometric system of Bertillon are: 1. Its greater simplicity of operation. 2. The small cost of the apparatus required. 3. The fact that all the skilled work required is transferred to the central office, and so it is only there that experts are required. 4. Greater rapidity of operation. 5. Greater certainty of results.

Galton has shown that the papillary ridges on the palms of the hands and the soles of the feet, in which are situated the mouths of the sweat glands, are clearly de-

veloped in the newborn child and are permanent throughout life, and as long after death as the epidermal structure remains undestroyed by putrefaction or other causes. Also, the patterns made by these lines on the finger bulbs are unique and characteristic for each individual. says Galton:[1]

There appear to be no bodily characteristics other than deep scars and tattoo marks, comparable in their persistence to these markings; at the same time they are out of all proportion more numerous than any other measurable features. The dimensions of the limbs and body alter in the course of growth and decay; the color, quantity and quality of the hair, the tint and quality of the skin, the number and set of the teeth, the expression of the features, the gestures, the handwriting, even the eye color, change after many years. There seems no persistence in the visible parts of the body except in these minute and hitherto disregarded ridges.

As their persistence is thus co-equal with somatic existence, and their variety of pattern infinite, so as to exclude possibility of identity in different individuals, it is evident that in them we have a perfect basis for a system of personal identification, if only a practical method of classification can be devised which admits of extensive subclassification. E. R. Henry, commissioner of police of the metropolis of London, at that time inspector-general of the Lower Provinces, India, has succeeded in doing this in a way which is both simple and satisfactory, and which has been widely adopted by the police departments in India, England, many cities of the United States, throughout Australasia and for the registration of native and Chinese laborers in South Africa. The apparatus used is simple and inexpensive, ordinary white paper, not too highly glazed, printer's ink, a piece of flat tin fastened on a board, and a roller for spreading the ink thereon. In our Army there is also a form holder to hold the card in which the impressions are taken (Fig. 1). Although the impression of any one finger is sufficient for identification, the impressions of all ten are taken for the purpose of classification.

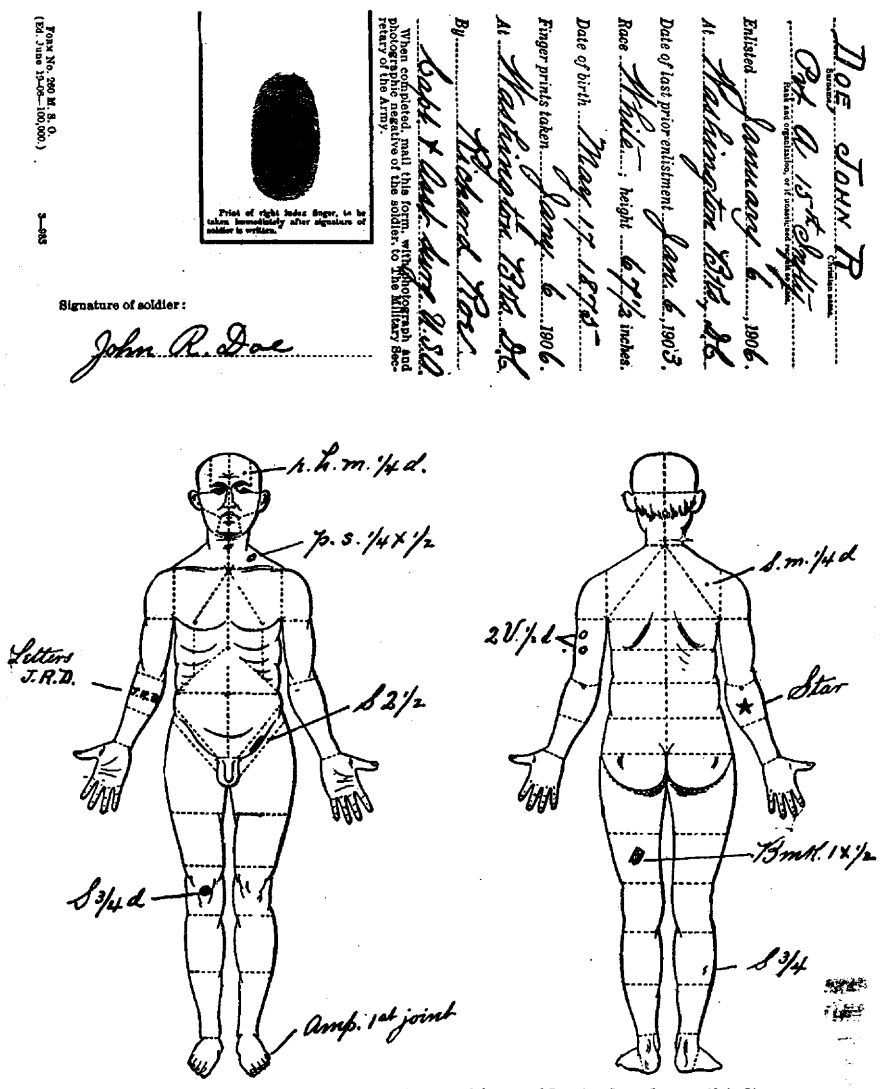

Fig. 2.—Sample record, skin markings side (reduced one-third).

PROCEDURE.

The process is as follows: A few drops of printer's ink are placed on the tin and spread in a thin even film by means of the roller. The operator then takes the right hand of the person whose finger print is to be taken and turning it palm out in a position of extreme pronation, places the thumb on the tin and turns the hand until the palm faces inward, thus applying a thin coating of ink to the palmar surface of the last joint of the thumb. He then places the thumb on the paper in the upper right-hand compartment, with palm of the hand out (away from the body), and rolls the thumb until the palm is inward and the whole palmar surface of the last joint of the digit has been applied to the paper. The same process is then gone through with for each finger of both hands. This is called the rolled print, and is that used for identification. Then the four fingers of each hand, held together, are touched to the ink film and then to the paper simultaneously without any turning movement. These are called plain impressions and are useful to verify the sequence of the rolled impressions. Thus, if, by error, the latter should not be taken in proper sequence the fact can be discovered and the error corrected from the plain impressions. Finally, on the briefing fold on the back of the blank (Fig. 2) the plain impression of the right index finger is taken just above the soldier's signature. His conspicuous scars, tattoos and other marks are then noted on the outline figures, front and back, his height taken, the entries on the briefing fold filled in and the form is complete. A photograph taken at a fixed distance of 54 inches with a standard lens, both of full face and profile, is then taken (Fig. 3), and a print made from the negative. This print and the negative, together with the

1. Henry, E. R.: "Classification and Uses of Finger Prints," p. 18.

finger prints, are then sent by mail to the War Department, Washington for file.

CLASSIFICATION.

The method of classification and file of the finger prints is, briefly stated, as follows: The patterns of finger prints are divided into two general classes, loops and whorls. In the former are included the arches and in the latter the composites. Each of the ten prints will be there, either a loop or a whorl, designated L or W, respectively, and the ten digits, being taken in pairs, there will be four possible combinations of each pair, which are written as a key thus:

LL	LW
WL	WW

Since we have the same number of combinations for the second pair, each of which can be combined with each arrangement of the first pair, the total number of combinations will be 16 for the two pairs; 64 for three and 1,024 for the five. This number being the square of 32, a cabinet containing 32 sets of 32 pigeon holes each will be necessary for all combinations of the loops and whorls of the ten digits taken in pairs. This cabinet is divided into four quarters by a vertical and a horizontal bisecting line, each containing 256 pigeon holes, each quarter in the same way into 4 eighths, each eighth into 4 sixteenths, and each sixteenth into 4 thirty-seconds, containing 4 pigeon holes apiece.

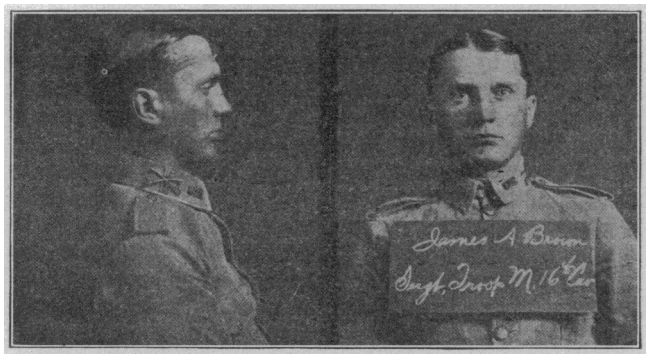

Fig. 3.—Form of photograph adopted as part of the identification record system (reduced in size).

If a finger print is received for file in which, for example, the right thumb is a loop, the index a whorl, the middle finger a whorl, the ring finger a loop, the little finger a loop, the left thumb a loop, the left index a loop, and so on, the formula for the print would be LW, WL, LL, WW, LW. By reference to the key above given, the first pair of letters, LW, would be seen to be in the upper right quarter of the key, which would locate the card in the upper right quarter of the cabinet. The second pair, WL, would further locate it in the lower left sixteenth; the third pair, LL, in the upper left sixty-fourth division; the fourth pair, WW, in the lower right two hundred and fifty-sixth division, and the fifth pair, LW, in the upper right pigeon hole of that division.

To subclassify the cards in a pigeon hole from each other and break up large accumulations in one compartment of the above primary classification, a secondary system of classification is made based on the occurrence of arches and loops which are radial or ulnar in position with reference to the index finger or fulcrum.

A still further differentiation is made by counting the number of ridges which intervenes between characteristic fixed points in the impression of a finger, known as the inner and outer terminus, and by noting other characteristics of the ridges with reference to them. For the details of this method the reader is referred to the little book by Henry.[1]

BENEFITS OF THE SYSTEM.

An expert in searching for a duplicate by these methods can find it in five or six minutes if it exists in a record of 100,000 cards.

This system will be very valuable in obviating the necessity of much correspondence and collection of evidence at present required to prove identity in cases coming before the War Department and the Pension Bureau. After the introduction of this system, any man who has had service in the Regular Army, can at once establish his identity by placing his right forefinger on the ink pad of an ordinary rubber stamp and making a finger print below his name. Unknown dead, brought from battle fields into field hospitals, or who die there, can in this way give a record which will lead to their identification; and a copy of the finger print buried in a vial with the body will be a permanent and certain identification of it. It is expected that the new system will be put in operation soon after Oct. 1, 1906.

THE TREATMENT OF FRACTURES OF THE PATELLA.*

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This theme certainly lacks the element of novelty, since Barton gave the impulse toward its solution by operation, in 1834. Nor is there any dearth of numerical data to shed light on it. Seven years after the report of the first successful cases of the antiseptic period by Cameron and Lister, Jalaguier, in 1884, was already enabled to collect ninety-four cases of patellar suture with five deaths from infection, not to mention a few disasters like ankylosis, amputation, etc. Eight years ago Powers collected over seven hundred additional cases from literature and from personal reports. The surgeon who is fond of figures, can find few richer fields for statistical deduction than is afforded by the enormous literature at his command. The harvest may be rich. I gladly leave it to another, for farming of this sort is little to my taste.

The fact that the entire question is brought before this tribunal at this seemingly late day, by request, is proof of the unsettled state of some of its features, and perhaps in an irrelevant way, of the slowness of the surgical mind to determine definitely that any one thing is the right thing to do, if another that is not very far wrong can be done.

This brings us at once to the meaty feature in the contention between conservatism and operation in the treatment of fractures of the knee cap. Good and even excellent results can be obtained by conservative measures in many cases, even if a restitution to the normal is not thereby attainable. Operation is, therefore, always one of expediency only. Many years ago, it is said, Malgaigne offered a large monetary prize to him who would show him a bony union of a broken patella. In his classical brochure, published in 1880, embodying a study of one hundred and twenty-seven cases, Hamilton concludes that under any plan of treatment a fibrous

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-seventh Annual Session, June, 1906.